Annals. Series on Economy, Law and Sociology, Volume 8, Number 1/2025
Romania, June, 2025 ISSN ONLINE 2067-5704
©2025, Academy of Romanian Scientists

CLIOMETRICS – SOME (CRITICAL) THEORETICAL ISSUES

Emil Dinga[1]
[1] Centre for Financial and Monetary Research „Victor Slăvescu", Romanian Academy; Romanian House, Building West, Floor 5, Room 5715, Romania, ORCID 0000-0002-3750-3248; Academy of Romanian Scientists; emildinga2004@gmail.com (corresponding author)

ABSTRACT: The paper addresses two themes regarding the (relatively) new method of macroeconomic analysis called cliometrics (together with its „pair", cliodynamics): theoretical issues, and epistemological issues. From a theoretical perspective, four issues are examined: the theoretical vocation of cliometrics is examined, the relationship between cliometrics and Kuhnian cognitive paradigm is assessed, the rapport between cliometrics and scientific research, and the correlation between cliometrics and economic theory. Regarding the epistemological perspectives, the concept of truth (including truth testability) is exposed and analysed, in correlation with the truth testing through cliometric modelling. Finally, the theoretical examination, and the epistemological evaluation are put together in order to discuss the issue of prediction/predictability based on cliometric modelling, from two perspectives: Bayesian probabilities, and propensive probabilities.
KEYWORDS: reaction function, responsible public debt, fiscal reaction function, fiscal target, public debt multiplier, ratchet effect, sustainability

DOI 10.56082/annalsarscieco.2025.1.4
.

1. INTRODUCTION

In the most general sense, cliometrics is defined as a quantitative study of the history of economy. In the [1], with its representatives: Friedrich List, Bruno Hildebrand, and Karl Knies [2]. It should be noted that the German school of history proceeded by induction, that is, it proceeded to interpretation/generalization based on particular cases identified from a factual/event point of view. Now this stage of studying the history of economy is called the old German historical school, and the new stage, inaugurated by the birth of cliometrics, is called the new history of economy.[2] The term cliometrics was proposed by mathematical economist Stanley Reiter in 1960, while the (roughly semantically equivalent) term new economic history was introduced by Jonathan Hughes, in an article co-written with Reiter.[3]

Cliometrics therefore refers to the study of economic history using quantitative methods (usually from the arsenal of methods and techniques already developed by econometrics, i.e., by applying mathematical statistics to economic phenomena/events). Cliometrics, at least in its early stages, developed within neoclassical economic theory – especially considering that econometrics, in turn, is a tributary of the same neoclassical economic theory – but, subsequently, it tends to abandon this theoretical framework (especially under the impact of the discoveries made by behaviorism – behavioral economics – based on cognitive psychology and evolutionary biology). This new direction of cliometrics is called cliodynamics. The term beginning – more precisely, until 1940 – the history of economy was built as a narrative theory – see, here, the famous German school of economic history [10]

cliodynamics was introduced by Peter Turchin in 2003 [10]. Cliodynamics is also attracted, like almost all economic research compartments in recent decades, towards the evolutionary perspective,[4] a perspective that is, in my opinion, a type of approach that also includes institutionalism, as a species. This means, implicitly, that cliodynamics falls outside the conceptual jurisdiction of neoclassical economic theory.

2. CLIOMETRICS AND THEORY

Discussing the theoretical aspects of cliometrics requires setting the perspectives from which to develop such a discussion. We believe that the following three perspectives may be relevant: a) is cliometrics a theory? if so, what kind of theory; if not, what is, in essence, cliometrics? b) what is the relationship between cliometrics and the cognitive paradigm? c) how does cliometrics fit into the synoptic of scientific research in general? d) what is the relationship between cliometrics and economic theory?

(a) Cliometrics – a theory?

To verify whether cliometrics is a theory, we must first establish the (minimum) list of sufficiency predicates of a (generic) theory. We consider these predicates to be the following:

- predicate *P1*: there is a *research domain* that can be explicitly and completely described –

cliometrics can "claim" such a domain: it refers to economic history;[5]

- predicate *P2*: there is an *explanatory paradigm* of the research domain – the explanatory paradigm refers to a coherent corpus of principles that underlies the provision of causalities in the research domain. In my opinion, this predicate is not verified by cliometrics. Cliometrics does not come with such a corpus of principles (precepts, assumptions[6]) that would warn or assure us about the capacity, intentionality, and the way in which it will elaborate, present and support the explanations identified in relation to its research domain;
- predicate *P3*: there is a *mechanism for testing*[7] the explanations provided.[8] Cliometrics, as defined by its authorized representatives, contains such a testing mechanism. Moreover, cliometrics even comes with the invention of an empirical test, namely counterfactual testing/analysis[9].

So, of the three sufficiency predicates that we consider in identifying the "citizenship" of a theory, cliometrics verifies two (the domain, and the testing mechanism) but it does not verify the third (the explanatory paradigm). The conclusion is that cliometrics *is not* a theory.[10]

(b) Relationship between cliometrics and cognitive paradigm

We will examine this aspect based on the logical concept of cognitive paradigm. A personal point of view on the logical concept of paradigm was presented elsewhere [5], and the analysis in this paragraph will be based on that model. First, it must be said that, if cliometrics is not a theory (as we tried to show above) it does not follow that it is not a paradigm too. The fact that it is or is not a paradigm (of course, of a cognitive type) must be examined separately. We will first analyze the possibility that cliometrics verifies the sufficiency predicates of a praxiological paradigm (which is, in my opinion, the complete form of a paradigm):

- *value*: cliometrics *does not have* a value assigned/associated to a specific finality of its functioning. In this sense, cliometrics "borrows" the value to guide it in its steps from the founding theory. For example, considering the current state of cliometrics (i.e., 60 years after its creation) it still massively uses neoclassical economic theory (cliodynamics, as I mentioned before, is making a brave attempt to get out of this harmful tutelage but has not yet found a general theory that represents its axiological foundation);[11]
- *core*: *prima facie*, cliometrics does not have any primitive principle[12] that would organize the finality of cliometric research. However, in my opinion, one could accept such a principle (that would account for the core of cliometrics), namely: the principle of historicity. By the principle of historicity, one could understand the fact that cliometric analyses are applied, necessarily, to long (i.e., historical) time series, and not to phenomena that unfold over relatively short periods. The purpose of cliometric analyses is, of course, to estimate long trends (long "waves") in the studied phenomenology, which, ultimately, could constitute patterns of historical behavior. Therefore, from the perspective of the core, it seems that cliometrics verifies the sufficiency predicates of a cognitive paradigm;
- *function*: the finality of cliometric analysis is rather of an *inductive* nature. Even if, from a scientific point of view, induction is very vulnerable,[13] it cannot be rejected *de plano*. However, in my opinion, cliometrics cannot provide a clear function of its specific analyses (as, for example, the neoclassical economic paradigm does[14])), because from an instrumental point of view (at least up to this point) it simply takes over econometric techniques;
- *logic*: as for the fourth predicate of a cognitive paradigm – logic – here things are clear: cliometrics uses the only logic allowed for the analysis of past phenomena, processes or events, namely *counter-factuality*[15] (which Fogel himself introduces into scientific research, credited, as I have shown, as being, together with Douglass North, the pioneer of the new history of economy).

Therefore, cliometrics cannot be considered a praxiological paradigm – it lacks the sufficiency predicates called value and function (if, with "good will", we concede that it possesses the sufficiency predicate called core, and logic, respectively, as shown above). If we examine cliometrics from the perspective of the sufficiency predicates that define the cognitive paradigm (to which I believe cliometrics should be associated), we find that of the two required predicates – core and logic – it can be considered a paradigm only on condition of accepting the core that seems to be its own, namely the principle of historicity. Accepting this core has a constitutive basis, however; cliometrics represents the study of the history of economy with (predominantly) quantitative means. The fact that, for the moment, these means (methods, techniques, instruments) are of econometric origin is not relevant; in long term,

cliometrics can develop its own quantitative means of investigating the history of economics.

(c) Cliometrics and scientific research

Cliometrics must, of course, also face the questioning of its relations with scientific research. The fact that, as we "agreed" above, cliometrics seems to verify the criteria of a cognitive paradigm does not mean at all that it is (necessarily, that is, automatically) also a scientific research approach – for instance, a theological doctrine or an artistic theory can verify the paradigmatic criteria of knowledge, without*, eo ipso*, constituting scientific approaches. As it is known, the scientificity (of a theory, method or research result) must verify the criterion of falsifiability, that is, of factual testability.[16] In the following, we will make some considerations on this issue:

- first of all, it should be noted that cliometrics is not a theory, even if it is (or we can concede that it is) a paradigm. In this sense, cliometrics needs a background theory, on the basis of which not only the research itself but also, above all, the interpretation of the results obtained can be carried out. For the moment (abstracting, as previously mentioned, from a "dissident" attempt represented by the emergence of cliodynamics) cliometrics has neoclassical economic theory as its background theory;
- not being a theory, its main research method – namely counter-factual analysis – must be applied based on counter-factual predictions issued on the basis of the "borrowed" theory;
- in this context, cliometrics functions, most often, as a method or even (i.e., less than a method) as a technique or tool of analysis. We conclude that cliometrics remains in the territory of science, not through a theoretical work of its own, but through the direct (and, moreover, inevitable) association with a pre-existing theory.

(d) Cliometrics and economic theory

As shown above, cliometrics is defined as the quantitative study (or by quantitative means) of the history of economy. At least in this way and with this aspiration it was invented. This means that cliometrics acquires its personality through association with economic theory. Despite the various currents and orientations in the area of economics (of a philosophical, moral or epistemological nature) to the question of whether there is an economic theory, that is, a theory of economic phenomenology, the answer can only be affirmative. The most developed theoretical direction in economics is still the neoclassical theory, a consequence of its axiomatic basis (that is, of its...economic basis from a principled point of view) but, at least in the last 5-6 decades, other directions of causal description of the economic process have developed (on less axiomatic bases): institutional economics, behaviorism, evolutionary economics, political economy (the latter with many hesitations generated by some ideological apprehensions). We conclude that cliometrics is necessarily connected to economic theory, whatever it may be, and that, moreover, it cannot function (at least in its original meaning, as a quantitative study of the history of economy[17]) unless connected in this way.

3. CLIOMETRICS AND TESTABILITY

We "agreed" above that cliometrics is not, by itself, a theory. We also accepted its paradigmatic profile and, in addition, we did not reject the (possible) scientific character of cliometric approaches, respectively of the results of cliometric analyses. From "possible scientificity" to "certain scientificity" one can, however, reach only one way: through empirical testing.[18] In this paragraph we will carry out an assessment (of course, at a logical, qualitative level[19]) of testability in the matter of cliometrics. The testability (respectively, as we have shown previously, the scientificity or falsifiability) of a cliometric result encounters a major difficulty from the beginning, in fact insurmountable at the level of the standard means used in the matter at the moment: it is about the issue that, with regard to a fact/event that has occurred, predictions can no longer be made,[20] so artificial or natural experiments can no longer be organized. In connection with this difficulty (we could say, of an ontological nature) we can make the following considerations:

- in the social domain (and therefore in the economic domain) there are no repeatable events;[21]
- the non-existence of repeatable events prohibits prediction; [22]
- the prohibition of prediction makes factual testing impossible.

Therefore, the testability of the results obtained through cliometric research must be examined within the framework of a distinct theory, capable of using these results in the formulation of testable conjectures, that is, in the formulation of conjectures involving repeatable economic phenomena. This indirect testability is, of course, no less relevant or significant than the well-known direct testability, but it implies a distinct element, which is, moreover, necessary, in relation to any result obtained in

economic and/or social research: a stage of interpretation of the experiment, which credibly proposes a transition from the testing (or testability, as the case may be) of a result incorporated in a "carrying" theory and the corresponding result obtained through cliometric research. As I said, such a procedure is implicit in any testability in the economic or social field, but in relation to cliometrics it seems to acquire an imperatively explicit character. Figure 1 provides a synoptic image of this issue.

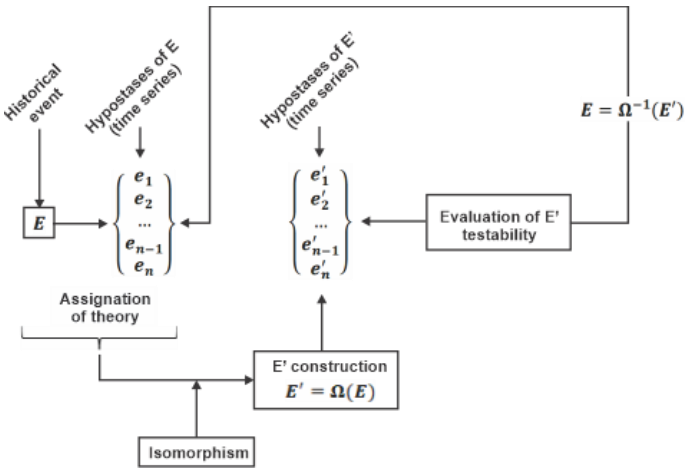

Figure 1. Indirect assessment of the testability of a historical event subjected to cliometric analysis

Source: author.

4. EPISTEMOLOGICAL ISSUES OF CLIOMETRICS

The epistemological aspects of cliometrics concern (at least) the following: (i) the problem of truth; (ii) the problem of testing truth; (iii) the problem of the relevance of truth.

(i) The issue of cliometric truth

In the problem of the nature of truth, two questions must be resolved: (a) the question of the nature of truth; (b) the question of the type of truth.

a. the nature of cliometric truth

The cliometric truth is a "special" truth. More precisely, it is a truth that we can call *dated truth*. By dated truth we understand the truth associated with an unrepeatable event (fact). If we examine the Popperian-type correspondence truth, we find that this is an undated truth, in the sense that, with greater or lesser accuracy,[23] it can be "proven" repeatedly (especially for the future), so that it is indefinitely testable from the perspective of the possible number of tests.

The concept of dated truth can be further characterized, from an epistemological point of view, as follows:

- it is characterized by historical necessity. The concept of historical necessity can refer to philosophical theories that accept historical laws (which, however, is not my intention at all), therefore I will specify what I understand by historical necessity of dated truth:

  – the theory of historical materialism of Marx and Engels[24] is well-known, which accepts objective laws of the historical course of mankind. Of course, the objective laws of history are extracted, within historical materialism, on inductive[25], bases, which makes them operable for the future as predictors (at least that was the hope of the founders of this philosophical trend);

  – the historical necessity of the dated (cliometric) truth does not consider the acceptance of this predicate within historical materialism,[26] but refers to the fact that, given the occurrence of the historical event in question, we can draw the conclusion that the set (i.e., the complex) of causal and conditional factors that generated that event were located in the domain of necessity, otherwise, the respective event would not have occurred. More explicitly: if exactly that event occurred, but not another, this means that history "selected", from all the possibilities, that possibility that was already recorded by the collective memory as having materialized at a given moment, in a given space. Therefore, whatever the other possibilities (i.e., the other alternative or competing events) were, the manifested causal complex "classified" those alternative events in the contingent, not necessary category. We specify that the term contingent has, here, a *post factum*, not *ante factum* meaning;[27]

- in an expression with rebarbative connotations, I would say that dated truth is a factual truth, without being an empirical one;[28]

- the factual character of dated truth also gives it the property of being definitive, that is, of no longer being able to be changed;[29] it should be mentioned, however, that empirical truth cannot be changed either (that is, it is unalterable), in the sense that, no matter how many experiments are done to test it, it remains the same, of course within the theory or hypothesis that predicts it;[30]

b. the type of cliometric truth

Once the dated nature of the truth exhibited by cliometrics has been established (or accepted for the sake of discussion), the question of the type of truth in question arises. As it is known, according to Aristotelian lines, there is only one type of truth, namely truth-correspondence,[31] which can be characterized by the following:

- it refers to a statement (either about a factual or an empirical) and not to the factual or empirical about which that statement is made;[32]
- the (predictive) statement in question is true if and only if the description (therefore also a statement) of the factual/empirical in question coincides, from a semantic point of view, with the predictive statement; the (predictive) statement is false, in the case of its semantic non-coincidence with the corresponding descriptive statement;
- given the fact on which, regarding dated truth, predictions cannot be made, can there still be a truth of correspondence type in the case of cliometrics? I make the following considerations in this regard:
  - the only truth, if it exists, in the field of cliometrics, can only be of the type of truth-correspondence; of course, it must be specified that it is a dated truth-correspondence;
  - the problem of logical truth is posed, in the case of cliometrics, in the same way as it is posed in other cases, here we have, therefore, no differences, because cliometric statements are subject to the same grammatical and logical rules as any other statement.

A synoptic exemplification of the problems regarding the nature and type of cliometric truth is made in Figure 2.

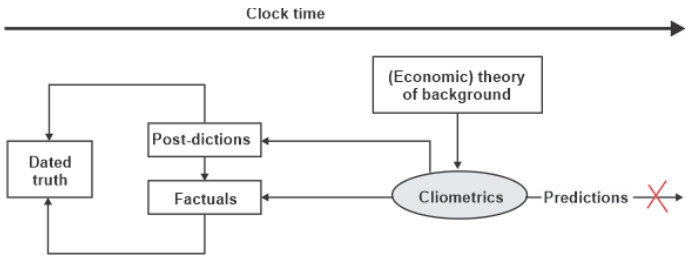

Figure 2. The cliometrics truth

Source: author.

(ii) The issue of cliometric truth testing

Obviously, the issue of truth testing arises only after the possibility of testability of the results of cliometric analysis has been demonstrated (as shown before, with the conditions mentioned there, first of all, with the condition of placing the cliometric analysis under a theory – most often, an economic theory – that would "guarantee" testability). As we have tried to show, testing cliometric results can only be done on factual data. Even so, in the absence (of the possibility) of predictions, it is necessary to use counter-factual analysis. Fogel, whom I have mentioned above, although he did not initiate it himself, applied the counter-factual method or technique, or counter-factual analysis for the first time in a factual research of the past [2].

- first, we will note that, coincidentally or not, the term used is counterfactual analysis, and not counter-empirical analysis, which is consistent with the distinctions made previously between factual and empirical;
- second, we will have to discuss a difficulty related to the concept of counter-factuality itself:
  - the historical factual (the one ascertained by recording/measurement or by some memory), since it occurred, means that it met the minimum threshold of causality and conditionality, in competition with other alternatives; this is the reason, by the way, why, above, we categorized the past factual as a historical necessity;
  - the suggestion of a "competition" between alternatives immediately arises – that is, of a model through which we can "justify" historical necessity and which may be the following: this necessity operated a "natural selection"[33] between the possible alternatives located on the margin of a causal/conditional complex and the "competition" was won by the factual that history records as such from an ontological point of view, as existing at given a point in space-time;
  - at this point in the discussion, let us pose the problem of counter-factuality (of course, here only from an epistemological point of view): how could we construct (more precisely, how could we know) the presumptive counter-factual to the historical factual that actually occurred? The answer is *theoretically closed*, that is, it depends on the theory that serves as the background (background theory) of the cliometric analysis in question. There are the following alternatives:
    - the theory allows for only one alternative to the historical factual, namely the negation[34] (or inverse) of that historical factual, so we have only one counter-factual;
    - the theory allows for several alternatives to the historical factual, each of which is assigned a probability. But what is the appropriate type of probability in this case? In my opinion, this is an opportunity to use propensity probability: that probability which is "inherent" (objectively[35]) to the presumed factual. Inherence is, in turn, also based on the selected background theory so,

in the case of a single counter-factual alternative, the (propensity) probability[36] assigned to it is 1, while, in the case of several alternatives, CF_a^i with $i \in \mathbb{N}$, the propensity probabilities assigned are $\mathbb{p}_i$, with the Kolmogorov condition verified, i.e., $\sum_{i=1}^{n} \mathbb{p}_i = 1$; in this context, (the counterfactual) testing will be a testing closer to logical testing, that is, to testing possible worlds, namely one (as we have already argued) of the truth-correspondence type.[37]

– in this context, (i.e., counterfactual context) testing will be a testing closer to logical testing, that is, to testing possible worlds, and one (as we have already argued) of the truth-correspondence type.

(iii) The issue of cliometric truth relevance

The issue of the relevance of cliometric truth (dated truth, testable only counter-factually and so on) also has interesting epistemological connotations.

In the case of a single counter-factual alternative to the historical factual, the truth in question is "verified" only if, under the aegis of the theory accepted as background, the propensity probability of the historical factual is higher than that of the counter-factual (or, of course, the reverse: the propensity probability of the counter-factual is lower than that of the historical factual, depending on the data available to make the estimation in question[38]). Here, the issue of super-unitary[39] probability or, equivalently, to some extent, the issue of violating the Kolmogorov condition of the unity sum of probabilities assigned to a complete probability field [9], as well as of negative probabilities in economics [1] are also to be discussed.

We conclude that, from the perspective of the relevance of the type of dated truth, specific to cliometrics, testing represents a logical/inferential estimate, from the background theory.[40] More precisely, testing cliometric truth is subject to the condition *as if* (from the German *Als Ob*),[41] introduced long ago in the theory of knowledge [15]. We have, therefore, a relevance of a strongly hermeneutic nature, located on the border between factual objectivity and idiosyncratic subjectivity.

5. CLIOMETRICS – PREDICTION AND POST-DICTION

In fact (as some researchers, self-called epistemologists,[42] demand), the relevance of a truth (therefore, including cliometric truth, of the dated type) is obvious in its capacity to formulate true predictions (strictly speaking, to make predictive statements that are corroborated by empirical or, with some risk of oxymoron, empirical factual). Given the singularity (uniqueness) of historical factual, it is impossible for the results of cliometric analysis to be used for predictions, at least for causal type predictions.[43] My opinion is that correlation type predictions are not possible either, precisely as an effect of the uniqueness of historical factual. Let us discuss, however, in more detail, the possibility of predictions, respectively of post-dictions from the perspective of Bayesian probabilities or propensity probabilities.

(i) Bayes probabilities

It is always possible to assign subjective probabilities to unique events, such as historical facts subjected to cliometric analysis[44]. The question arises whether these subjective probabilities are (or can be) Bayesian. As is known, Bayesian probability is a subjective probability but which is adjustable as new information (more precisely, objective new information) appears regarding the conditional of the subjective probability in question. If a probability distribution is assigned for the first time to the occurrences of a certain future event, this is called *a priori* probability (function) (or, equivalently, probability distribution), and when new information appears, the a priori probability is adjusted and becomes *a posteriori* probability (function). From the examination of historical facts that fall under the scope of cliometric analysis, it follows that, with regard to a given historical fact, no new information can emerge – that fact has already occurred. Therefore, *prima facie*, Bayesian probabilities are not adequate to describe the occurrence of historical facts, although they may be applicable to historical counter-factuals, especially in the case of the existence of more than one alternative that the background theory allows for the historical fact in question actually occurring.

(ii) Propensive probability (or Popper probability)

Broadly speaking, propensity probability is obtained by combining the concept of propensity[45] or inclination, tendency, etc., with the concept of probability. The distinctive feature of propensity probability is that it refers to singular (unique, unrepeatable) events, for which, obviously, the frequency probability is impossible to use (there is, as is self-obvious, no archive of such probabilities) and the subjective probability is not accessible either. In other words, propensity probability is an objective probability (just like frequency probability), but it is assigned subjectively, more precisely, on inferential bases from the background theory of cliometric

analysis. Some specifications regarding the concept of propensity probability are useful for further reasoning:

- the expression propensity probability denotes the process by which a given propensity (of a thing, a property, or a relationship) is "translated" into an objective probability; the alternative name (that of Popper probability) is a recognition of the fact that the most coherent vision on such a type of probability was provided by Karl Popper, the well-known philosopher of science of the 20th century;
- from a conceptual point of view, propensity probability does not express a manifested tendency of the entity to which it is associated; also, it does not express any expectation (hope, assumption, etc.); basically, propensity probability refers to a potential behavior (kinematics, dynamics, transformation, etc.) of the targeted entity. How exactly do we have knowledge about such a potential behavior? At the end of this article, we will present some considerations in this regard:
  - since, as mentioned, we are talking about a singular event that has not yet occurred, it is obvious that we do not have any knowledge about that event;
  - therefore, the assessment of the propensity of the event that is to be triggered (or is to occur) must be made from a perspective that has no connection with the respective event;
  - such an assessment must be made, however, on a basis, as far as possible, objective, because the propensity represents an objective property;
  - putting together all the conditionalities just listed, we can say the following:
    - establishing (elucidating, assuming, etc.) the propensity of an entity simply represents a theory/hypothesis;[46]
    - this theory/hypothesis cannot be developed inductively (since the event to which the respective propensity is associated has not yet occurred), and, obviously, neither abductively;
    - the only way it can be developed is the deductive path;
    - the deductive path used for "profiling" the propensity is, on the other hand, completely external to the entity in question (including external to the expected event);
    - as far as I know, no theory or methodology has been developed in the specialized literature to establish the propensity in this (necessarily) external way to the object in question;[47]
  - if we have such (possibly) insurmountable problems regarding the propensity, there will be equally insurmountable problems regarding the association of non-frequency objective probabilities to the propensities, in order to obtain what we have called the propensity probability.

REFERENCES

1. Blass, A., Gurevich, Y. (2020). *Negative Probabilities*. *What they a and what they are for*. https://www.researchgate.net/publication/344347842_Negative_probabilities_What_they_are_and_what_they_are_for.
2. Diebolt, C., Haupert, M. (2016). Second Edition). *Handbook of Cliometrics*. Springer.
3. Diebolt, C., Haupert, M. (2018). *A Cliometric Counterfactual: What if There Had Been Neither Fogel nor North?* Cliometrica, nr. 12.
4. Dinga, E. (2021). *Institutionalism as a species of evolutionism*, Management of Sustainable Development Journal, vol. 13(1).
5. Dinga, E., Oprean-Stan, C., Tănăsescu, R.C, Brătian, V., Ionescu, G.-M. (2022). *Financial Market Analysis and Behaviour. The Adaptive Preference Hypothesis*,
6. Heisenberg, W. (2008). T*he Part and the Whole. Discussions about Atomic Physics*, Humanitas Publishing House.
7. Hodgson, G.M. (2019). *Evolutionary Economics. Its Nature and Future*, Cambridge University Press.
8. Kuhn, T.S. (2008). *Structura revoluțiilor științifice*. Editura Humanitas.
9. Lo, A.W. (2019). *Adaptive Markets. Financial Evolution at the Speed of Thought*, Princeton University Press.
10. Mejía, J. (2015). *The Evolution of Economic History since 1950: From Cliometrics to Cliodynamics*. Tiempo y Economía, 2(2).
11. Nelson, R.R., Winter, S.G. (1990). *An Evolutionary Theory of Economic Change,* Belknap Press.

12. Popper, K. (1959). *The propensity interpretation of probability*. The British Journal for the Philosophy of Science, 10 [apud Nuel Belnap, *Propensities and Probabilities*, Studies in History and Philosophy of Modern Physics, 38, 2007].
13. Popper, K. (1996). *The Misery of Historicism*, ALL Publishing House.
14. Runde, J. (1996). *On Popper, Probabilites, and Propensities*. Review of Social Economy, no. 64 (apud Simboli, B. (2017)).
15. Vaihinger, H. (2001). *Filosofia lui „ca și cum”*. Editura Nemira.

NOTES

[1] The two great principles of the German historical school are: 1) the rejection of the general validity of economic theory in the study of economic history; 2) the rejection of the logical and mathematical method in historical research (especially in the historical research of economics).

[2] One of the creators of this stage in the study of the history of economy is Douglass North, the creator of institutionalism in economic dynamics (Nobel laureate in economics, together with Robert Fogel, in 1993). Both economists are considered pioneers of cliometrics. However, the term new economic history was introduced by Jonathan Hughes, and the term cliometrics was introduced by Stan Reiter.

[3] Other sources consider there to be three "godfathers" of cliometrics: Stanley Reiter, Jonathan Hughes, and Lance Davis [3].

[4] Evolutionary economics has developed not only at the macroeconomic level – see a very good synthesis of this trend in [7] but also at the microeconomic level [11] or of markets [9], through which Eugen Fama's efficient market hypothesis – EMH, is generalized with regard to financial markets.

[5] Economic history (or, equivalently, the history of the economy) concerns economic activity or the economic system, that is, the praxiological domain of economics, not its cognitive domain (of economic science or Economics).

[6] We do not, of course, require that the principles (or precepts or assumptions) be of axiomatic type, in the sense of axiomatic theory, there is no need for such a bar of analysis, but we only require the existence of a presentation of the explanatory modality.

[7] Testing a theory/hypothesis can be done in two ways: a) a logical coherence test (also involving the grammatical/formal correctness of the formulation of the results); b) an empirical (factual) test.

[8] Explanation and prediction are logically equivalent: explanation is post-diction, and prediction is a pre-explanation. So, when we say testing the explanation we also say testing the prediction.

[9] Counterfactual analysis was introduced into the literature – both as a research method/technique, and as a testing method/technique – by Fritz Machlup (1952), and Conrad and Meyer (1957 and 1958) but was developed and "popularized" by Robert Fogel [3].

[10] As, by the way, neither econometrics nor econophysics are theories, for the same reason.

[11] In my opinion, such a theory can only be evolutionary economics, which also integrates institutional economics [4].

[12] The expression "primitive principle" borders on pleonasm, since nothing is more primitive than a principle. However, although a principle cannot be reduced to something more fundamental than itself, in a family (a set) of principles it is possible to find a guiding principle of the other principles (in which case, of course, the other principles, in turn, are not reducible to the "leading" principle, because in that case they would become theorems).

[13] Unless it is integrated into abduction (remember that abduction is, in essence, a plausible initial explanation, necessarily based on the research of a particular, that is, on induction).

[14] Namely, minimizing the opportunity cost in economic choice.

[15] Counter-factuality has, of course, its own problems – extremely difficulty in the social/economic field, although not as difficult in the natural sciences – but it is not the subject of the present study. Here I will only state that the outcome of counter-factual analysis depends decisively on the background theory on which the cliometric research is carried out, because counter-factual analysis is carried out under the conditional *if:* what would have been *if* what was had not been?

[16] Not of testing, but of testability, that is, of a potential (possible) but necessarily empirical testing (either as an artificially arranged and observed experiment, or as an observed natural experiment).

[17] Obviously, the term "history" in the phrase "economic history" allows (and has already allowed) that cliometrics can be applied to any time series containing long-term historical data, not only historical data of an economic nature. Thus, studies of geology, paleontology (i.e., natural history), ethnology, religious beliefs, political organization, etc., that involve long series of empirical data are perfectly compatible with the use of cliometrics. The association of cliometrics with long time series, i.e., with history, is part of the essence of this method, otherwise it would be confused with the indispensable econometrics of time series (as many authors, by the way, really believe is the case).

[18] The logical equivalence of testability, factual falsifiability and scientificity has been demonstrated (in any case, it is widely assumed at the level of the scientific community in all fields), the most famous advocate of this equivalence being Karl Popper himself. Here it is worth remembering that testability is different from demonstration by testing, just as the scientificity of a result is different from demonstrating its scientific character, and the falsifiability of a theory (hypothesis) is different from demonstrating the false (or true) character of that theory (hypothesis). The confusion between scientificity and scientific character is quite common even among epistemologists, not to mention "researchers" who have no epistemological culture (more generally, regarding the theory of knowledge), which does not prevent them, of course, from being very diligent in writing articles exactly about these issues.

[19] The assessment of testability cannot be done empirically, because empirical testing involves testability. The empirical experiment (artificial or natural) uses testability to test, so it cannot test testability itself.

[20] Making post-dictions is, of course, equivalent to making predictions in possible but proven non-necessary worlds, not in

worlds that have already occurred, i.e., proven necessary (*Nota bene*: a world is a state of affairs assigned, so to speak, to a point in space-time, either in the past or in the future)

[21] It seems that, strictly speaking, there are no repeatable events in the natural domain either, only quasi-repeatable ones (*Nota bene*: events that are neither repeatable nor quasi-repeatable are called singular events). Here lies the source of both the problem of *ad-hoc* hypotheses in empirical testing, and the problem raised in the Duhem-Quine thesis regarding Popperian-type falsifiability.

[22] Or, to be more rigorous (and more...honest) it prohibits frequentist predication (i.e., based on so-called objective probabilities, namely forming an archive generated by experience). Nothing prevents, however, predictions that are associated with singular (non-repeatable) events if Bayesian or propensity probabilities are used.

[23] Regarding the verification, within experiments (artificial or natural), of the conditions specified in the device of the hypothesis or conjecture on the basis of which the prediction is formulated.

[24] Theory taken up by Marx in his economic research (see *Das Kapital*), which accepts "laws", therefore necessary, inexorable processes, regarding the dynamics of the capitalist mode of economic production.

[25] Susceptible of false (see the famous examples provided by Bertrand Russell – the hen – or by Carl Hempel – the raven – in this matter).

[26] See here also Popper's (passionate) criticism of what he calls historicism, which he distinguishes from the concept of historicism [14].

[27] The *ante factum* meaning of contingency is logical in nature, the *post factum* meaning of contingency is ontological in nature.

[28] Indeed, the distinction factual – empirical seems unnecessarily analytical, given that factual and empirical are considered, in the specialized literature, to be semantically equivalent (therefore, as having the same denotation). The uselessness is, however, apparent, therefore, at the risk of pedantry, I will say the following: I call a *factual entity* a fact (usually, from the past, therefore hypostatized, but I do not exclude future factuals either) that is unrepeatable (in the sense of strict replication of their identity), and I call an *empirical entity* a fact (usually, from the future, therefore not yet hypostatized, but I do not exclude past occurrences either) that is repeatable (in the sense of strict replication of their identity). Thus, for example, Popper refers (correctly) to the fact that scientificity implies empirical testability, even though he (like his followers or critics) often speaks of factual testability although, as results from the present clarifications, testability can only be empirical.

[29] From a field other than epistemology, namely from the area of science fiction literature, comes to us the concept of a time machine that accepts the possibility of modifying events that I call definitive here. Meanwhile, both logic and some sciences (among which quantum theory stands out) have irrefutably demonstrated not only the impossibility of so-called time travel, but also the impossibility (if time travel were possible) of modifying events that have already occurred.

[30] We are in what Heisenberg called, in a well-known work [6], *theoretical closure* – any result, as well as any testing or interpretation of that result, are valid, relevant and meaningful exclusively within the theory, hypothesis or conjecture that obtained or "decreed" that result. Theoretical closure is extended by Kuhn to what could be called *paradigmatic closure*: any result, as well as any testing or interpretation of a result, are valid, relevant and meaningful exclusively within the paradigm in question, more precisely within what Kuhn calls *normal science* associated with a given paradigm, where normal science itself is *paradigmatically closed* [8].

[31] In fact, there is a second type of truth, which refers, however, to the logical correctness of a statement, without any connection with either factual or empirical matters (this type of truth is an effect of the epistemology proposed by Vienna Circle, within the logical positivism). It is obvious, however, that this type of truth is rather of the nature of a logical validity (correctness in relation to a set of rules for forming statements) or of the nature of a truth, so to speak, logical.

[32] For example, the statement "GDP decreased during the COVID-19 pandemic" is true if and only if, looking at the figures announced by the statistical office (figures presumed to be measured correctly and communicated as such) we find that GDP decreased during the reference period, being false otherwise – there is no question at all that GDP itself, or its decrease itself is true or false.

[33] Perfectly similar to natural selection (which, as is known, has two inalienable properties: it is directed and it is cumulative) that works in biology and, apparently, also in economics, especially in the financial market (more precisely, in the capital market – see, here, [9].

[34] Obviously, logical negation will never have an ontological objectification – from an ontological point of view it can be said that the negation of a historical factual is impossible (or has a probability of 0).

[35] Obviously, this is a different objectivity from (archive-based) frequency probability. One could say that it is, in a way, an objectified subjectivity – analogously to how Popper's third world is an objectification of inter-subjectivity (for example, the theory of objective probability, once published, passes from Popper's second world to Popper's third world).

[36] Propensity probability was introduced by Karl Popper (more precisely, it was explicitly used by Karl Popper, since, nominally, the concept was not introduced by him, but by Aristotle) to examine the problems faced by quantum mechanics, more precisely, to solve the problem of the probability of a singular objective event [12]. Popper defines propensity as representing *the dispositional properties of singular events*. Furthermore, he considers that propensity probabilities are more likely to be associated with indeterminism (i.e., randomness, not stochasticity) although, obviously, they cannot escape the principle of causality.

[37] I believe that propensity probability (more than Bayesian probability – which refers to a...subjective propensity – can be naturalized in economic analysis. Moreover, I believe that propensity probability represents, from a methodological point of view, the necessary (i.e., mandatory) counterpart of counter-factuality.

[38] Here it must be said that the use of econometrics in cliometric studies is methodologically problematic: indeed, econometrics uses frequency probabilities (Bayesian econometrics, which does not use frequency probabilities, but subjective probabilities, including or especially for singular events, however, does not use propensity probabilities either). Applying frequency probabilities (based on stochastic behaviors, not on uncertainty) does not seem to be... "honest" in the analysis of events that are modeled by propensity probabilities.

[39] Some approaches try to "save" the maximum numerical value of any probability (i.e., the value 1), making a distinction between probability and probability density (in the continuous case, of course) or, more precisely, between the probability function and the probability density function – the latter can indeed take super-unitary values.

[40] A new reason for economists to develop their personal logical reasoning capabilities.

[41] No matter how much it reduces the enthusiasm generated by the knowledge we acquire (including in the natural sciences), any such knowledge is permanently provisional (Popperian

falsificationism demonstrates this peremptorily), associated with an *as if* (for example, quantum theory or Keynesian theory are, each in its own way, hypostases of the *as if* condition – an operational, technical variant of the *as if* condition, which is the methodological *ceteris paribus* condition. From an epistemological point of view, the *as if* condition definitely places us in the territory of agnosticism – the true researcher must be (can only be) agnostic.

[42] We have in mind, here, Milton Friedman, the fundamentalist of positivism in economics, but also the pleiad of Nobel laureates in economics who built theories, from an epistemological point of view, on the basis of the neoclassical logical model, with its (in)famous homo œconomicus.

[43] Most predictions in economics (especially those based on econometric estimates) are not causal predictions, but correlational predictions – that is, based on the hypothesis, which should, in turn, be tested, but this step is almost always "skipped", that the correlations found for the past will be preserved in the future (the so-called R^2).

[44] Subjective probabilities are the expectations of the individual who assigns those probabilities (based on Laplace's principle of insufficient reason) to the hypostases of a future event (not to be confused with rational expectations which actually use frequency probabilities – see, for example, the calculation of mathematical expectation as the mean of a random variable and which, technically, is the 1st order statistical moment, just as the variance is the 2nd order statistical moment, etc., and the same for higher order moments in a given distribution: skewness, kurtosis).

[45] For example, in microeconomics, there is the concept of *marginal propensity to consumption*, calculated as the ratio between the absolute variation in consumption and the absolute variation in personal income, both variations being calculated for the same time interval.

[46] From an epistemological point of view, theory and hypothesis are semantically equivalent (they have the same referential).

[47] The question (very pertinent) arises, of course, whether such a theory is possible. As is known (since Aristotle), a theory (more specifically, a science) can only deal with (at worst) the general or (at best) the universal. Now, propensity is assigned to singular events. Singularity excludes both the general and the universal.